Improving HPV Vaccination Communication: Webinar Delivery of Announcement Approach Training

By

Karen Grossmann Todd, MD

A Master's Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements for
degree of Master of Public Health in
the Public Health Leadership Program

Chapel Hill

Spring 2019

Approved by:

_____

_____

Date

_____

_____

Date

ABSTRACT

Karen Grossmann Todd, MD: Improving HPV Vaccination Communication: Webinar Delivery of Announcement Approach Training
(Under the Direction of Lori Evarts)

Background/Objectives:

Since HPV (human papillomavirus) vaccination was introduced in the U.S. in 2006, adolescent immunization against HPV cancers has lagged expected rates. Educating physicians and other primary care providers to make a strong recommendation for HPV vaccine at every opportunity can lead to increased HPV vaccine uptake. However, it is a challenge to engage providers in continuing medical education (CME) to learn HPV vaccine recommendation techniques. Barriers to providers accessing CME include lack of provider time, lack of interest in subject matter, beliefs that providers are already utilizing this approach, cost, and access. This paper will examine a webinar CME program that teaches HPV vaccination communication strategies, delivered by physicians to physicians and their staff in 3 states, with an evaluation of opportunities and challenges of webinar delivery and the reach of the CME program.

Methods:

In 2018, our research team recruited and trained five board certified and licensed pediatricians as physician educators to deliver a live webinar continuing medical education (CME) course to clinics in Arizona, New York and Wisconsin. We recruited primary care clinics with the help of the physician educators to participate in a one-hour CME course, *Making Effective HPV Vaccine Recommendations using the Announcement Approach*. This CME course was presented by the physician educators via live, interactive webinar format during a 21-week period. At the completion of the study period, a co-investigator trained in qualitative methods used phone interviews with the physician educators and research associates to evaluate their experiences. Analysis of clinic participation data were undertaken to determine the reach of this CME training.

Results:

The interviewees felt underprepared to recruit clinics to the study, and they agreed that initial contact with clinics would have been enhanced if a contact person had been identified ahead of their first call. Interviewees agreed that summer recruitment was challenging because recruited clinics stated scheduling issues due to provider vacations. The use of influential affiliations, such as the CDC, NCI, or the AAP, was perceived to be valuable in attracting clinics to the CME offering. Physician educators enjoyed using the live webinar software platform (Zoom) for distance education, citing ease of use and no travel as reasons for its appeal; however, technical glitches such as participants lacking webcams or the presentation lacking sound made for frustrations for both the CME presenters and the clinics receiving the instruction.

Of the initial pool of 233 clinics in AZ, NY, and WI identified as possible participants in this intervention, 200 clinics were successfully contacted, and 32 of them (16%) participated in the CME webinar. We had an average of 3.3 prescribers per clinic participate in the webinar CME, for the 3 states included in this study. With 16% of clinics successfully completing the webinar, the reach of our program was considered lower than expected.

Conclusions:

Announcement training about HPV vaccination, using a physician-to-physician live webinar, is a convenient method to deliver training to healthcare providers that can result in improved HPV vaccine coverage for adolescents. Physicians and public health professionals have an important influence over the recommendation of HPV vaccination, and with stronger communication skills, HPV vaccination uptake for adolescents can improve. However, our interventionists experienced challenges in recruiting physicians and their staff to participate in this free CME effort, and our reach was limited to only 16% of clinics contacted.

Further implementation research is needed to discern how best to engage the provider and support staff in interventions that will result in strong recommendations.

KEYWORDS: Human papillomavirus vaccines, HPV Cancers, Adolescent Health, Healthcare Providers, Continuing Medical Education, Announcement Approach, Vaccine Hesitancy, Immunization

ACKNOWLEDGMENTS

The author would like to express sincere gratitude to the members of the UNC Department of Health Behavior's Health Cognition Lab, especially Dr. Noel Brewer and Dr. Melissa Gilkey (content advisor for this effort), who allowed my participation in their work over these last two years. I am grateful for the support from co-investigators Jennifer Leeman, Susan Alton Dailey, and Jen Heisler-MacKinnon, and research assistants Maddie Kameny and Rachel Kurtzman, during various stages of this project. Special thanks to the University of North Carolina Gillings School of Global Public Health Public Health Leadership Program, and to my advisor, Professor Lori Evarts, for her encouragement and guidance. And to my husband and children, I am so grateful for your love and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AAP	American Academy of Pediatrics
ABP	American Board of Pediatrics
ACS	American Cancer Society
AFIX	Assessment, Feedback, Incentives, eXchange (quality improvement strategy)
AZ	Arizona
CDC	Centers for Disease Control and Prevention
CME	Continuing Medical Education
EHR	Electronic Health Record
HP 2020	Healthy People 2020
Hib	*Haemophilus influenzae* type b
HPV	Human papillomavirus
IOM	Institute of Medicine
KFF	Kaiser Family Foundation
MOC	Maintenance of Certification
NCI	National Cancer Institute
NY	New York
PDSA	Plan-Do-Study-Act
RCT	Randomized Control Trial
Tdap	Tetanus, Diphtheria, Pertussis
UNC	University of North Carolina at Chapel Hill
U.S.	United States
VFC	Vaccines for Children
WI	Wisconsin
WHO	World Health Organization

Introduction

Since its introduction in 2006, HPV vaccination has lagged expected rates among U.S. adolescents. Healthy People 2020 (HP 2020) goals included that HPV vaccination coverage for adolescents ages 13 to 15 reach 80% (Healthy People 2020 [HP 2020]). However, as of 2017, the national coverage for HPV vaccine completion in adolescents is estimated at 50% for females and 42% for males (HP 2020). HPV vaccination completion rates of less than 50% for U.S. teens lags the other recommended adolescent vaccines, specifically tetanus, diphtheria, pertussis (Tdap) and meningococcal vaccines. Tdap and meningococcal vaccines are both above 80% coverage in the teen population, meeting the Healthy People2020 goal (Walker et al., 2018). Human papillomavirus currently infects 79 million Americans, with approximately 14 million new infections estimated per year (Kaiser Family Foundation [KFF]). HPV is classified as a human carcinogen, associated with the development of cancers of the cervix, oropharynx, vagina, vulva, penis, and anus. Improved HPV vaccination coverage could prevent HPV infection and subsequent morbidity and mortality. While cancers of the cervix and vagina attributed to HPV have been on the decline, there have been increases in HPV-related cancers of the oropharynx and anus over the last 20 years (CDC/MMWR Aug 24, 2018). Vaccination of adolescents has led to a decrease in pre-cancerous conditions in females, such as cervical dysplasia and adenocarcinoma-in-situ (Oakley et al., 2017). However, because most adolescents are still under-vaccinated, HPV cancers and precancers continue to be a significant public health threat. With a safe and highly effective vaccine available that prevents many cancers, health care providers need to step up their efforts to improve HPV vaccination coverage for adolescents.

Pediatricians, family physicians, and other primary care providers have the opportunity to recommend HPV vaccine during routine clinic visits. The Centers for Disease Control and

Prevention (CDC) recommends routine vaccination of adolescents at ages 11 or 12, although children may be vaccinated as early as age 9 (CDC, 2016). Physicians can communicate about HPV vaccine during well visits, sports physicals, or acute care visits, and *any clinic visit* should be considered an opportunity to vaccinate. Because of the long-standing, trusted relationship that families have with their child's medical provider, parents often look to their child's provider to make recommendations about immunizations as part of preventive care.

During clinic visits, physicians can share their strong recommendation for HPV vaccine as well as endorsements from organizations such as the American Academy of Pediatrics (AAP), the CDC, and the National Cancer Institute (NCI). When HPV vaccine is strongly recommended by a provider, children and adolescents have over 9 times the odds of initiating the series when compared to no recommendation (Gilkey et al., 2016). A high-quality recommendation by the provider conveys that the HPV vaccine is very important, that the vaccine is protective against some cancers, and that parent/patient should vaccinate during the visit (Gilkey, 2016). In a previous study, only 1/3 of parents reported receiving a high-quality recommendation from their providers to vaccinate against HPV (Gilkey, 2016). Because strong recommendations result in higher vaccine initiation and completion rates, providers can benefit from understanding the components of a high-quality HPV vaccine recommendation, and how to deliver that recommendation to families, to improve HPV vaccine initiation and completion for their adolescent patients (Dempsey et al., 2016; Gilkey, 2016).

Vaccine hesitancy has been named one of the top 10 global health threats for 2019 by the World Health Organization (WHO, 2019). As discussed by both the Institute of Medicine (IOM) and the President's Cancer Panel, there are many barriers to vaccination that impact consumer's confidence in vaccination: negative perceptions about vaccines, mis-information disseminated by social media and other news outlets, and perceived diminished risk (IOM, 1994; Reiter et al., 2018; HPV Vaccination for Cancer…, 2018). Providers may lack sufficient time to discuss these concerns or may have discomfort or a lack of knowledge to address HPV

disease and the vaccine itself. With the use of concise, evidence-based messages, providers can ease parental concern about HPV vaccine by addressing several topics: vaccine safety, disease prevention, age of vaccine initiation, gender, school requirements, vaccination before sexual debut, and national recommendations (Shah et al., 2019). Parents who express hesitancy to vaccinate or who have specific concerns regarding HPV vaccine may leave the appointment without getting their child vaccinated. This is an obstacle to vaccination that can be addressed with provider training using an "Announcement Approach" (see Figure 1; Brewer et al., 2017). The "Announcement Approach" begins with the physician noting the child's age, announcing that children of this age are due for three vaccines, and stating that the child will receive those vaccines at today's visit. By using the "Announcement Approach," physicians, mid-level providers, nurses, and office staff can confidently recommend the HPV vaccine at every clinical opportunity.

Educating physicians and other primary care providers to recommend HPV vaccination effectively and ease parental concern with evidence-based messages can lead to increased HPV vaccine initiation and completion (Brewer, 2017). Provider recommendations for HPV vaccinations are so influential, and continued research is needed to discern how best to engage providers and their support staff in interventions that will result in strong recommendations (Gilkey et al., 2015; Brewer, 2017; Reiter, 2018). Reasons that healthcare providers may not engage in continuing education regarding HPV vaccine include lack of time, knowledge, cultural or policy concerns, or structural barriers such as lack of technological capability), and no requirement to do so from, for example, the American Board of Pediatrics (ABP) or AAP or their state's medical board (Palmer, Carrico, & Costanzo, 2015). Encouraging attendance at continuing medical education (CME) activities, like on-site HPV vaccine trainings or remote webinars, and evaluating the intervention's effect on clinic vaccination rates can yield program planning information to enhance the education of primary care physicians nationwide (Reiter, 2018). Our objectives for this study were to 1) evaluate the experiences of the interventionists

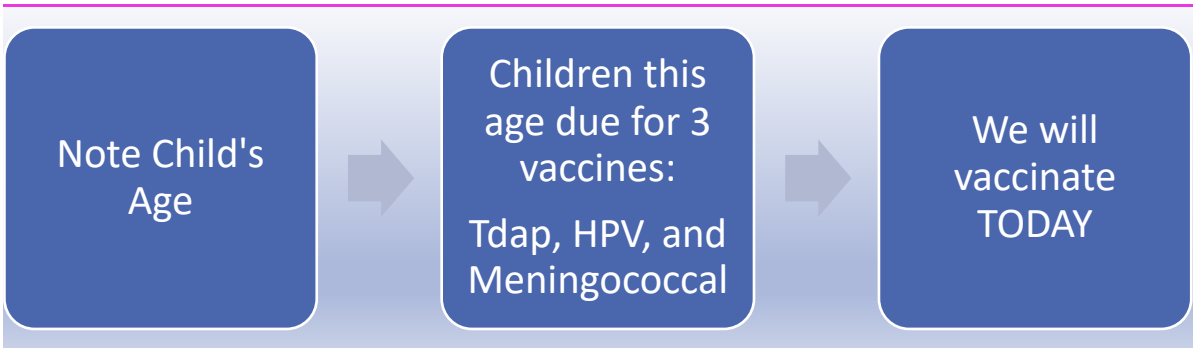
delivering an HPV vaccine-focused CME to primary care providers; and, 2) assess the reach of this program to clinicians. The application of this analysis can be used to improve provider CME about HPV vaccine communication, while addressing our objectives regarding delivery and reach. This paper will evaluate how our webinar trainings were implemented across several primary care clinics in the U.S, in order to further our understanding of what obstacles and opportunities exist for training physicians in this communication approach.

Methods

Overview

Our team of physician educators delivered "Announcement Approach" Training, a communication training developed by University of North Carolina at Chapel Hill (UNC) researchers about effective HPV vaccination communication, to providers and staff of primary care clinics in three states. The webinar training, *Making Effective HPV Vaccine Recommendations Using the Announcement Approach for HPV Vaccination,* is a one-hour continuing medical education (CME) effort and was offered over a 21-week period in mid-2018 (Figure 1). Our "Announcement Approach Training" is part of a larger 4-arm randomized controlled trial (RCT) involving **AFIX** (**A**ssessment, **F**eedback, **I**ncentives, e**X**change, a quality improvement program from the CDC to support providers in the Vaccines for Children program). The goal of these programs is to increase HPV vaccination coverage for adolescents. The larger RCT will evaluate this physician-led communication training to three other arms in the trial, including a control group, a group that received vaccine education from AFIX, and a group that received vaccine education from both AFIX and our physician-led initiative. This intervention was approved by the UNC Institutional Review Board (IRB # 18-0146).

Healthcare provider uses **presumptive announcement** for adolescent and their parent:



If a parent hesitates, CONNECT, CLARIFY, AND COUNSEL:

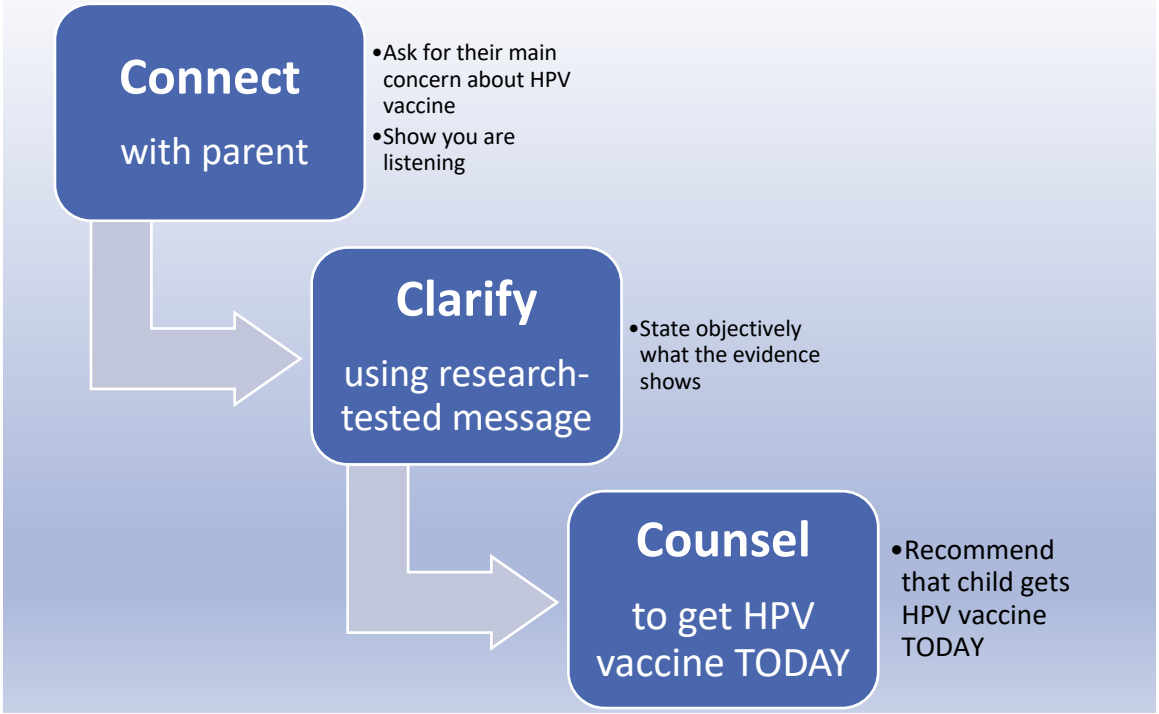


Figure 1: Announcement Approach Training for Physicians, to strongly recommend HPV vaccination during a clinic visit (Brewer et al., 2018).

Clinic recruitment and participation

For this study, five board certified and licensed pediatricians were trained as physician educators (PEs) to deliver a live webinar continuing medical education (CME) course. Clinics in Arizona, New York and Wisconsin were recruited by our physician educators and research assistants (RAs) to participate in a one-hour CME course, *Making Effective HPV Vaccine Recommendations using the Announcement Approach*. This course was presented by the physician educators via live, interactive webinar format during a 21-week period from April to September 2018 (Table 1). The Announcement Approach Training CME course was developed by UNC behavioral scientists to train physicians and their staff to share effective, evidence-based messages about HPV vaccine that ease parental concerns, in order to improve HPV immunization rates (Brewer, 2017). Using a software webinar platform, physician educators delivered this one-hour course to teach the importance of making strong and effective HPV vaccination recommendations to health care providers in these three states.

Participants (PEs, RAs, participating providers)

We recruited clinics from Arizona, New York, and Wisconsin who were identified as Vaccines for Children (VFC) providers by these states, either in pediatric or family practice clinics, each with ≥ 200 active adolescent patients ages 11-17 years, with coverage rates of HPV vaccine (1st dose) < 85%. Clinics with an adolescent patient population between 200 and 7000 patients were eligible. Hospitals and pharmacies were ineligible. Clinic networks consisting of < 30 clinics were included. Clinics in a "network" were grouped together so that each clinic network could be randomized, using a cluster variable.

All five physician educators who delivered this intervention were board-certified pediatricians with clinical interest and expertise in adolescent vaccination. The research assistants were graduate students in the UNC Gillings School of Global Public Health, Department of Health Behavior.

Intervention strategy

Announcement Approach Training for HPV vaccine communications, delivered in a one-hour live webinar, is an intervention strategy built on evidence-based methods of physician communication. An implementation science framework (Figure 2) can be applied to evaluate this strategy (Proctor et al., 2009). Clinics were contacted, recruited, and scheduled for this webinar training by the interventionists (physician educators and research assistants) using email, telephone, or both. A successful contact was defined as telephone interaction between a member of the intervention team and a clinic being recruited, in order to explain the webinar CME offering. If the clinic agreed to participate, they were scheduled to receive the webinar at a time convenient to them. After scheduling, the clinic participants were sent a packet of materials which included: pre- and post-training surveys, a training fact sheet, a disclosure statement, an "Announcement Approach" training card, and an exercise worksheet (see https://www.HPVIQ.org). Prior to the start of the webinar, participants were asked to complete a pre-training survey. The webinar was delivered at the scheduled time by one of our team's physician educators using Zoom video conference technology (https://zoom.us/about). Live, interactive delivery allowed for free-flowing discussion between participants and the physician educator, and there was time for questions throughout the presentation. Group learning during the webinar included slides and video programming, with a review of HPV vaccine background information, an introduction to the Announcement Approach, and role-play exercises comprising the implementation strategy. Embedded in the slide presentation were two videos, one from Cervivor (cervivor.org) which included an interview with a cervical cancer patient, and another with a demonstration of a physician-parent interaction using the Announcement Approach. Vaccine prescribers (physicians and mid-level providers) were eligible for one hour of CME credit after completing the webinar. Participants were asked to take the post-training survey at the conclusion of the webinar.

Using the Proctor implementation framework, we can examine outcomes, such as *feasibility* and *reach,* to inform future programming decisions (Proctor et al., 2009). In implementation research, feasibility is defined as a program's appropriateness for a particular service or setting, while also taking into account what resources might be needed to execute this program (Proctor, 2011). Reach, or penetration, is defined by Proctor as "the integration of a practice within a service setting and its subsystems" (Proctor, 2011). *Fidelity* to training script, *cost* of training, and *patient outcomes,* other endpoints in Proctor's model, will not be addressed in this paper but are opportunities for further study.

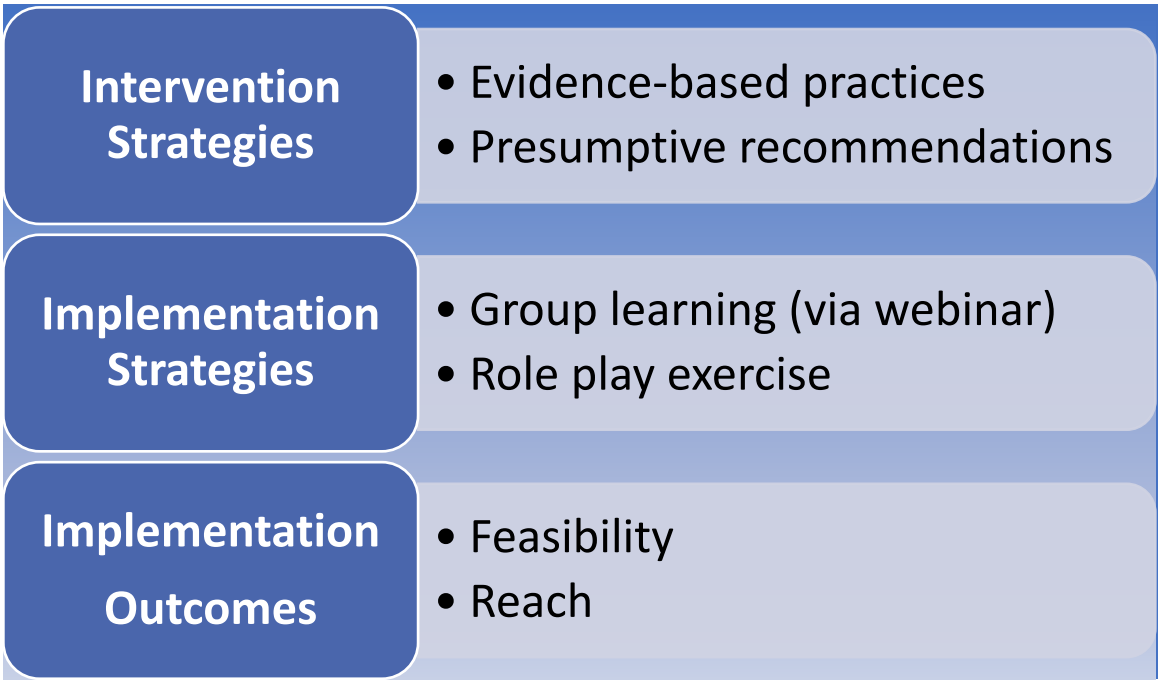


Figure 2: Implementation Research Model for HPV Vaccination Communication, based on Proctor's Implementation Research Methods, 2009.

Intervention data collection

For program evaluation and planning purposes, a co-investigator interviewed the five physician educators who recruited clinics and delivered the CME webinars, and the three research assistants who joined later in the process to also recruit and schedule clinics. The interviewer used an interview guide (see Appendix) to question them by telephone about the recruitment and delivery of the webinar programming, as part of a debriefing effort at the completion of the intervention period. The interviewer was a public health investigator from the UNC research team trained in qualitative research methods. She asked the physician educators about items such as: what techniques were used to get clinics to commit to the CME; any difficulties they encountered in scheduling clinics; the amount of time allocated for recruiting clinics; and, any technological challenges they encountered in delivering the live webinar on a software platform. She interviewed the research assistants about their recruitment efforts, scheduling challenges, communication and documentation concerns, and interpersonal interactions with the physician educators. With permission, the interviewer recorded these debriefing interviews for later transcription. In addition, the team collected data regarding the number of clinics that were invited to participate in the CME and the number of clinics that received the CME intervention, in an effort to determine the reach of the Announcement Approach Training project.

Analysis

I examined the interventionists' interviews using qualitative analysis for the purposes of 1) improving the implementation and reach of the Announcement Approach Training CME, 2) decreasing physician and research associate time spent in recruitment of clinics, and, 3) identifying the opportunities and barriers in delivering the CME. The analysis of these interviews included multiple readings, to identify shared topics discussed by the interventionists. Four major topical categories emerged: recruitment of clinics, factors influencing webinar

participation, communication strategies, and opportunities for improvement. During the coding process, I identified themes within each of these four topics, and then I identified quotations within the interviews to support the emerging themes.

Reach was calculated by looking at the number of CME program participants divided by the total number of contacts invited to participate in the CME program.

Results

Aim 1: Experiences of P2P Interventionists

Review of the exit interviews for both the physician educators and the research associates revealed four common topics, including recruitment issues around contacting clinics, factors that influenced clinics to participate, communications among the study team members and with clinics, and opportunities for improvement of the webinar content, recruitment, or delivery. Several themes within each of these topics emerged during the review and coding process.

Recruitment challenges/contacting clinics

Theme 1: Physician educators felt underprepared to recruit clinics and lacked sufficient time to recruit**---** All five of the physician educators agreed that they were not fully prepared to "sell" the webinar and recruit clinics as part of their participation in the CME process. One interviewee commented about feeling underprepared:

> "I was totally unprepared for the cold-calling salesmanship aspect of the project… not a good fit for what I do well."

Physician educators expressed their frustration with recruiting, and many mentioned that their skillset or strengths did not include this process. For others, there was discomfort in repeatedly reaching out to clinics who were unresponsive or showed little interest. PEs expressed feeling more supported in recruitment efforts once the research associates became involved in the

recruitment process midway through the study. There was consensus among the PEs and RAs that recruiting, follow up, and scheduling was much more time-consuming than they had planned. PEs commented about needing support earlier in the study process to reduce the time PEs spent in recruitment and scheduling. RAs mentioned that the recruiting process was smoother after they were brought in to assist the PEs, several weeks into the study. Physician educators felt that the recruiting process required more time than teaching the webinar:

> "The delivering of the webinars in terms of the fraction of time I spent on the project was very minor compared to the time spent… calling."

Theme 2: Timing of recruitment and webinar scheduling is crucial to maximize physician participation**---**Scheduling providers for webinars required several weeks of lead time, due to delays in office staff communicating with MDs to get approval to schedule. In addition, team members shared that scheduling the study during the summer months proved to be a challenge because providers were often away on vacation, and those left covering in the office were busy with well checks and sports or school physicals. For the Arizona partners, it was reported that summer is when many providers were out in the field on Native American reservations delivering healthcare.

Factors influencing webinar participation

Theme 3: Recruiters perceived that influential affiliations improved their recruitment efforts**---**PEs and RAs utilized affiliations with UNC, AFIX, CDC, and the health department [of the specific state] in their discussions with clinic representatives, to urge participation in our educational intervention. Some led their first contact call with affiliations, to lend legitimacy to the effort:

> "I actually said 'state VFC program' because I thought that sounded more legitimate…this is a joint project with UNC School of Public Health, the CDC and [local] state health department."

Theme 4: Physician interest and perception of value influenced participation**---** Interventionists expressed conflict about understanding what motivated scheduling and participation in the webinars. Some interviewees commented that their selling points of free CME, at the clinic's convenience, with no travel required, were attractive to many clinics, while three of the five physician educators stated that CME alone was not a sufficient motivator for scheduling:

> "I think people liked knowing that they didn't have to travel, they could do it from wherever they were."
>
> "I don't think that one hour of CME was going to make a big deal of difference for them. It's really going to be about whether they want to change their behavior."

Physician or practice-wide interest in improving HPV vaccination rates was a reason to participate, according to interviewees. Some practices seemed disinterested in the CME offering or confused about their clinic's selection for this process. Interviewees mentioned that clinics who did not schedule commented: "We're too busy." "We just had this with AFIX." "You know, our numbers are already good." "Why were we chosen for this?"

Communication strategies

Both physician educators and research assistants agreed that streamlined communication strategies and tools were a benefit to this study.

Theme 5: Internal communication was a challenge for remote teamwork**---**Research assistants described challenges in communicating with physician educators when trying to decipher their notes in Dropbox, an online file hosting service, that was used for the first part of this study (Dropbox.com). Dropbox is not able to have multiple users of the same document, and this became a problem for the study team.

> "[There were] multiple different sheets where information had to be kept, [and it] was a little bit confusing."

A transition was made to Google Drive, which did allow multiple users, and communication improved (Google.com). However, some PEs were not updating their spreadsheets or keeping up their online calendar availability, so RAs expressed frustration at trying to schedule webinars for those physician educators.

> "That could be problematic at times, because if you were scheduling a webinar for them—you were acting on behalf of them and then if they weren't updating the shared calendar, you might have a clinic that's ready and waiting to go but you don't have anything to tell them."

Weekly meetings were held for PEs and program managers, and for RAs and program managers, to ease communications and talk through these challenges. Phone, email, and text communications were utilized to clarify concerns on an as-needed basis.

Theme 6: Communications with clinics via email and phone were difficult without a designated contact**---**With dozens of clinics being contacted by multiple people during the recruitment phase, our team faced challenges in clear and timely communication with the clinics in Arizona, New York, and Wisconsin. PEs and RAs commented about inefficiencies in recruiting due to lack of a clear contact at each office. Initiating contact with clinics might have been smoother if a clear contact had been identified within each clinic beforehand.

> "The biggest barrier was not having a contact person."
>
> "The first line of contact in a clinic is more hesitant to direct you to someone [if you do not have a contact's name]."

For larger clinic systems, PEs expressed frustration about inefficiencies in trying to reach 20 or 30 clinics within that system, when contacting the leadership "at the top" would have been more efficient.

The recruiters utilized email templates that could be individualized to the recipient and the clinic itself. Regarding emailing clinics as an initial contact effort:

"Email didn't work. We tried emailing ahead [of the phone calls], and I think the '.edu' email address just winds up in people's spam box."

Theme 7: Teaching while using technology has advantages and challenges**---**

Using the Zoom software platform (Zoom Video Communications), we were able to connect with clinics around the country and in different time zones, at their convenience, without the teacher or the participants traveling. However, communication between the PEs and the remote clinic receiving the webinar could be challenging. Webinars were conducted by physician educators who used Zoom to send out webinar invitations and to connect to clinics at the time of the scheduled webinar. All of the PEs commented that Zoom worked well most of the time. Two PEs commented about being able to hear participants but not being able to see them, or vice versa. Some webinar participants did not have access to a computer with a webcam, and some called into the Zoom webinar by telephone, therefore remaining "unseen" by the presenter for the duration of the webinar. If the participants could not be seen or heard, presenters felt uncomfortable.

"There were no webcams… made it very difficult to know if people were paying attention or participating. I felt like I was talking to an empty room."

Early in the study, some participants commented that they could not hear the demonstration video that was embedded in the slide show presentation. Some PEs felt stressed when trying to help participants troubleshoot technological problems, while trying to stay on script. If two persons from the research team were on the live webinar, one could handle these unexpected events, and PEs perceived it to be a less stressful presentation.

Opportunities for improvement

The interviewer asked the research team about improvements that might improve future studies like this one. Physician educators and research associates felt that the use of a formal letterhead showing the UNC, AAP, and CDC affiliations might have lent some additional credibility to the initial email or fax contact sent to the medical office. PEs and RAs mentioned

that earlier involvement of research associates in the recruitment process would have been preferred.

Regarding content of the educational material, a PE mentioned having an active link within the presentation where participants could access the CME materials and patient resources, instead of relying on mail delivery (some clinics did not receive their packet of materials before their webinar). Two PEs suggested that the material in the presentation was too basic for physicians and nurses and needed to be more robust, less "dumbed down," with more fact-based discussion and less repetition.

Aim 2: Reach of Physician-to-Physician program in 3-state study

Based on data from Table 1, 90% of the clinics received at least one successful contact. This proportion does not include email or voicemail messages sent that did not result in a response from office personnel or providers. Of those successfully contacted, the percentage completing the webinar ranged from 13% to 21%. Among the three states in this study, completion rates were Arizona at 13%, New York at 21%, and Wisconsin at 15%. The average number of vaccine prescribers in attendance at each webinar was 3.4 for AZ, and 2.5 for NY, and 4.0 for WI. Non-vaccine prescribers (clinical or administrative staff) who attended averaged 6.1 for AZ, 3.2 for NY, and 6.1 for WI. Once scheduled, actual completion of the webinar was 82%-100%.

Making Effective HPV Vaccine Recommendations using the Announcement Approach **Program Reach**							
STATE	**# Clinics Listed as potential contacts**	**# Clinics successfully contacted**	**% successfully contacted**	**# Clinics scheduled for webinar**	**# Clinics completed webinar**	**% Participation (# clinics completing webinar/ # clinics contacted)**	**% Participation once scheduled (# clinics completing webinar/# clinics scheduled)**
AZ	76	71	93%	11	9	13%	82%
NY	56	56	100%	13	12	21%	92%
WI	91	73	80%	11	11	15%	100%
Total	223	200	90%	35	32	16%	91%

Table. 1: Arizona, New York, and Wisconsin participation in the Physician-to-Physician HPV Vaccination Announcement Approach Training Webinar, 2018.

In summary, our CME course, *Making Effective HPV Vaccine Recommendations using the Announcement Approach*, reached a total of 32 clinics from a potential pool of 223 clinics during the 21-week period from April to September 2018 (Table 1). Out of the 223 clinics identified, we were able to contact 200 of them, and we scheduled 35 of those contacted for the webinar. Overall, 32 (from n= 200 contacted), or 16%, of the clinics completed the webinar. Of the 56 vaccine prescribers who completed the post-training survey at the completion of the CME, 50 (89%) indicated they would apply for CME credit.

Discussion

Increasing adolescent HPV vaccination coverage and reducing the risk of HPV-associated cancers is a goal shared by many public health professionals in the United States (CDC, 2016; HP2020; AAP, 2017; NCI, 2019). Previous studies have shown that

Announcement Approach Training is more effective than conversation training in increasing HPV vaccine coverage in adolescents (Brewer, 2017). A brief presumptive announcement that a child is due for HPV vaccine, in addition to other routine immunizations, is effective for reassuring parents and alleviating their concerns (Brewer 2019). The announcement approach can be considered an effective tool at alleviating vaccine hesitancy and encouraging compliance with recommended vaccine schedules.

In evaluating our HPV vaccine communication training for physicians, I have identified strengths and opportunities for this strategy that can inform future planning and implementation efforts. Strengths for this study include the participation of all five physician educators (100% participation) in the debriefing interview process, which yielded many of the insights and suggestions for improvement that are contained in this evaluation. Another strength is the high rate of completion (average for three states of 91%) of the webinar once they were scheduled, despite the difficulties in initial attempts to contact eligible clinics. About 89% of vaccine prescribers participating stated that they would apply for our program's free one hour of CME credit. Clinic staff participation at the webinar was encouraged, and often the number of clinic staff exceeded the number of vaccine prescribers. We encouraged both vaccine prescribers and their clinical staff to carry the Announcement Approach Training messages back to their colleagues in the clinic setting, to support unified language within their practice while recommending the HPV vaccine to all adolescent patients.

The experiences of the interventionists, reported via qualitative interviewing methods, revealed several opportunities for improvement: 1) need for more in-depth preparation of the research associates and physician educators ahead of recruitment, 2) careful consideration for timing of webinar offerings, so as to maximize clinic participation, 3) use of affiliations with national and local organizations (like CDC, AAP, health departments) to lend legitimacy to our effort, 4) emphasizing tangible value to clinic, including ease of use, inclusion of entire staff, and opportunity for knowledge and CME, and 5) streamlined communications using phone, email,

and technology, with attention to support of physician educators during the recruitment process as well as during the webinars themselves (Table 2). One limitation of this phone debriefing method is that not every physician educator or research assistant was asked the same questions during their interview; hence, there may be additional information on these themes that was not obtained due to this omission.

Preparation	Clear expectations shared with PEs and RAs prior to recruitment	Contact names for each clinic available ahead of first recruitment attempt
Timing	Allow for several weeks between invitation to participate and actual scheduled date offered	Summer scheduling may not be ideal due to vacations of providers in targeted clinics
Affiliations	Include on email attempts and in script for phone contact	Consider close liaison with local health department, VFC, or AFIX representative to introduce webinar training
Value	Share with clinics how this training can directly help them achieve higher rates of HPV vaccination	Offer specific numbers for them about their coverage rates, if available
Communications • **Internal**	Frequent internal communication needed to avoid missed opportunities	Spreadsheets (Google Docs preferred over Dropbox); team meetings; timely response to text/email
Communications • **External**	Use of provided contact names to streamline recruitment	Contact for large clinic systems needs to be made with leadership first, who may then facilitate acceptance by individual clinics
Course Content	Active link within Zoom webinar to access course materials	Enhance presentation with more robust clinical material and add patient-friendly references

Table 2: Suggested improvements for remote CME recruitment and training.

The reach of the program was limited, with only 16% of the 200 clinics contacted by our research team completing the CME Announcement Approach Training. Without a similar training attempt to compare this to, it is difficult to comment regarding the reach of our program. Further offerings of this same physician-to-physician approach are being planned by our research team, and a comparison of their reach and impact is likely to be investigated after that intervention is completed.

Future directions

Improving the recruitment of clinics and the delivery, content, and reach of our CME training might be accomplished in several ways. According to a large national survey of practicing U.S. physicians, providers choose CME opportunities based on time, cost, and convenience (Cook, Price, Wittich, West, & Blachman, 2017). In this survey, providers indicated that short, concise, patient-care focused CME opportunities that are free or cost little are most appealing to them (Cook et al., 2017). This survey revealed that providers are using personal time to complete professional development activities, and many would like to receive CME credit for activities they are already doing in regard to patient care (Cook et al., 2017). Topic and content, and in many cases the reputation of the CME provider, factored into their decision to participate (Cook et al., 2017).

Recruiting busy pediatricians to our CME may be facilitated by partnership with local medical societies or state chapters. Connecting with the local AAP chapter to identify practice managers might be helpful in the recruiting process, with initial communications being aimed at the practice manager as the point person, if no VFC coordinator has been previously identified. Approaching the practice manager with the backing of the local AAP chapter may facilitate those communications. Through local and state medical societies, CME opportunities can be presented via email offerings, word of mouth, or as an in-person training at a society meeting. The live webinar format can be offered to a large gathering, much like it has been offered to several staff members of a clinic. The AAP offers numerous “Plan-Do-Study-Act” (PDSA) options for pediatricians and their staff to complete, with the opportunity to measure their impact on a specific outcome within their own clinic. A PDSA utilizing Announcement Approach Training could provide individual clinics meaningful feedback about their implementation of this approach and its effect on adolescent HPV vaccine coverage within their patient population.

The ABP offers maintenance of certification (MOC) CME opportunities, with an online catalog of choices that pediatricians can pick from in order to remain board certified in their field

or specialty. Including this webinar as a CME choice could be a way to reach thousands of pediatricians. In addition, the ABP offers *Question of the Week*, which is emailed to pediatricians and involves a question on specific subject matter, a pre-quiz, a case presentation, and a post-quiz. This short case and question/answer format usually takes about 30 minutes to complete. According to Cook's national survey, a majority of physicians polled (>65%) participate in self-directed "question of the week" CME opportunities (Cook et al., 2018). Including our webinar format (perhaps pre-recorded) as a Question of the Week choice might be a way to reach many physicians, in a relaxed and unscheduled manner that can be accomplished at home or office. These options can be considered for the dissemination of the announcement approach. Revising the CME material to fit into a 30-minute format, with a strong emphasis on the 'need to know' science, and with less repetition, is recommended to streamline this intervention. Reaching more providers with this training can positively impact vaccination coverage, ultimately reducing adolescents' risks of HPV cancers.

Consideration of Proctor's implementation framework suggests that additional research opportunities exist that might clarify the *acceptability, fidelity, cost, and sustainability* of this training (Proctor, 2011). As mentioned earlier, this study is a small part of a 4-armed RCT AFIX study that, when completed, will yield further opportunities to review these factors. Physician surveys completed after trainings can be reviewed for acceptability. Fidelity to course content could be assessed with the use of checklists or direct observation by research project managers. Cost of program implementation can be calculated based on review of salary data and time logs for PEs and RAs, with expenses for materials, postage, and Zoom licensure considered. Comparing the reach and cost of this remote program with a live, in-person CME training is a consideration for future research as well, to aid in determining the sustainability of this educational method. Vaccination outcomes research is needed to compare a clinic's vaccination coverage before the intervention and then some period of time after the training,

likely after 12 months, to see if the training has an end result of improving HPV vaccination coverage among adolescents in these practices.

Recommendations for Public Health Leaders

One of public health's greatest achievements to date has been the reduction or eradication of diseases through immunization (CDC, 2011). As a pediatrician and a public health professional, I emphasize the importance of vaccinations for the health and well-being of my patients. Another reason to encourage immunizations is that a well-vaccinated community can offer "herd" protection to its most vulnerable: newborns, the immunocompromised, and the elderly. Over the course of my 27 years as a physician, I have witnessed the near disappearance of diseases like *Haemophilus influenza*e type b (Hib), a bacterial illness responsible for epiglottitis, pneumonia, meningitis, and sepsis that resulted in severe illness or death for many children. Vaccination against Hib began in the late 1980s, and a 90% reduction of severe Hib-related illnesses has been documented since Hib vaccine introduction (CDC, 2015). The near-disappearance of Hib disease is a public health immunization success story.

In the last decade, however, I have seen many parents refuse vaccines, believing instead that the child's diet or environment would protect them, or that their families are not prone to "those diseases." Some parents have become skeptical of vaccines and openly express their beliefs that doctors are in a conspiracy with pharmaceutical companies around immunization promotions and sales. Infants are being admitted to the hospital with whooping cough, influenza, measles, and chicken pox. At the time of this writing, we are seeing outbreaks of measles in our country, a disease that was declared "eradicated in the U.S. in 2000," due to lapses in vaccination (CDC, 2018). The decline of herd immunity for diseases such as measles is a public health emergency. Medical providers need to mobilize and fight vaccine hesitancy and mis-information with science and statistics and highlight the proof that vaccines save lives.

Leadership in medicine and public health is greatly needed as we work to overcome the public's lack of confidence in vaccination. Parents are seeking information from a variety of

online sources, some of which are contributing to vaccine hesitancy with mis-information. The American Academy of Pediatrics (AAP) recently sent letters to social media giants Facebook, Google, and Pinterest, urging their CEOs to make certain that vaccination information on their websites is "credible, informed by science and from trusted sources" (AAP Urges Major Technology, 2019). The CDC, the NCI, and state health departments are using public service announcements on radio and television to dispel myths of the anti-vaccine movement as well. It is up to vaccine prescribers and immunization experts to listen to parents' concerns and then reassure them with accurate, evidence-based responses. Because vaccine hesitancy is a top 10 global health threat, experts in public health, policy, and medicine will need to join forces in vaccine education and promotion (WHO, 2019).

Programs like our physician-to-physician CME are meant to educate physicians and other health providers to that end, enabling them to address vaccine hesitancy with parents by confidently recommending HPV vaccine for their patients. The physicians and researchers leading the HPV Announcement Approach Training have a common goal: to increase HPV vaccination coverage among adolescents, thus preventing future cancer risk. As a physician leader for this project, I have embraced Quinn's *fundamental state of leadership* to venture outside of my comfort zone, to have my work reflect my internal values, to "put the collective good first," and to be alert to opportunities for change or improvement (Quinn, 2005). Word of mouth endorsement for the Announcement Approach Training CME has been shared among chapters of the American Academy of Pediatrics. In fact, the North Carolina Pediatrics Society heard about our presentation from another state's chapter president, and they requested that we present the training at the NC Pediatrics Society Winter Forum 2019 held in Winston-Salem, NC. The training was given in-person to approximately 75 pediatricians. Teaching the announcement approach to my pediatrician peers from across North Carolina was a leadership opportunity within public health and pediatrics, to encourage time-saving, factual information exchange between doctors and families regarding HPV vaccination.

Physician educators are leading efforts to improve vaccination coverage and have an opportunity to impact local, regional, and national practice, through peer-to-peer instruction. In 30 years, it is my hope that new cases of HPV-related cancer will have dropped significantly. Human papillomavirus (HPV) vaccine is a remarkable public health achievement, a safe and effective vaccine to prevent many cancers, to alleviate disease burden, and to reduce lives lost to HPV cancers.

APPENDIX

Interview Guide:

State/Regional AFIX Staff

Thank you for taking the time to speak with me about your experience with the HPV AFIX project that is being conducted by CDC and UNC. I'm Jennifer Leeman, an associate professor at the University of North Carolina. *Please note that the purpose of this call is not to evaluate you or your work. Our goal is to understand your experience working with HPV AFIX so that we can improve it.*

Just so you know, I will keep what you say confidential. I may include what you say in a presentation or report to illustrate a point, but I will not report your name or job title. Your participation in our conversation is of course completely voluntary, and you should feel free to stop the call at any time or skip any questions you prefer not to answer. Do you have any questions for me before we get started?

I would like to audio-record our call today so that I can revisit what you say later in more detail. I will not share the recording with anyone else at UNC or CDC. Is that okay with you?

First I am going to ask just a few general questions.

Introductory questions

1. What is your role in scheduling and conducting AFIX visits?

   Probe: About how long have you been involved with AFIX visits?

Scheduling visits – Reach to providers and adoption by clinics

The next few questions ask about scheduling the HPV AFIX visits as part of our study.

2. What has been your experience scheduling HPV AFIX visits for the study?
   Prompts: How easy or hard is it for you to contact a clinic's vaccine coordinator or other person responsible for ensuring that youth got vaccinations?
   Once contacted, how easy or hard is it to schedule an appointment?
   What are the major factors influencing clinics' decision about whether to agree to have you visit or not?
3. How do you invite or encourage clinics to include physicians and other providers to attend the AFIX visit? How successful have you been in getting them to attend? Why or why not?
4. What advice do you have for other AFIX reviewers about how to successfully schedule clinics? Encourage provider participation in visits?

Delivering each component of the AFIX visit – Implementation Fidelity/Feasibility/Acceptability

Now I am going to ask you about your experience delivering the HPV AFIX visit as part of the study.

5. Tell me about your experience delivering HPV AFIX visits.
6. How have you been using the study's PowerPoint slides?

Prompts: What has worked well? What has been most challenging?
Are you using all the PowerPoint slides during the visit or a subset of the slides?
What portions of the PowerPoint slides are you using? [send them a copy of the slides to thumb through].
What led you to modify the presentation?
During your visits did you coach clinics to identify who is responsible for each component of vaccine delivery? [show form from slide deck] What worked well? What was challenging?

7. How have clinics responded when you showed them their vaccine coverage report card? What has worked well? What has been challenging? What challenges, if any, did you experience with creating the report cards?
8. What has been your experience working with the clinics to
-set a measurable goal for improving HPV vaccine coverage?
- select QI strategies for improving HPV vaccine coverage?
- create an HPV improvement action plan, in other words, to identify the who, what and when
needed to carry out the QI project?
Probes for each of the above: What has worked well? What has been challenging?
9. What has been your experience following up with clinics after the AFIX visit?
10. What advice do you have for other AFIX reviewers about how to engage providers during the AFIX visit?

Activities related to study: recruitment and getting surveys completed

11. What was your experience providing CME credit for AFIX visits?

- How have you let those participating in the visits know about the opportunity to get CME credits?
- To what extent has CME credit been an incentive for provider participation?

12. For those clinics who were also assigned to receive the Physician to Physician webinars also called P2P – what actions did you take, if any, to remind them that they would also be invited to participate in webinars?

Beliefs about HPV AFIX

13. What impact do you believe the HPV AFIX visits have on clinics' HPV vaccination practices? Probe: Why do some clinics make improvements to their vaccination practices while others do not?

Suggestions for improving HPV AFIX

14. Do you have any suggestions for how to increase the HPV vaccination visit's impact on clinics' vaccination rates? Could be improved.
15. What advice would you give to colleagues who are considering using the HPV AFIX process and materials?

Maintenance

16. What aspects of the HPV AFIX study's process and materials do you plan to continue to use after this project has ended? Which will you stop using? Why?

Perceptions of support from UNC

My final questions are about the support you received from the UNC team. This support included the 2-day training in Arizona and weekly calls with Jen MacKinnon.

17. What worked well?
18. What could we improve?

19. What additional support would have helped you deliver the HPV AFIX visits to clinics in your state?

20. Do you any other thoughts or feedback about this project? Are there any questions I didn't ask that you wish I had?

REFERENCES

American Academy of Pediatrics. (2017). HPV Vaccine Implementation Guidance. Retrieved from https://www.aap.org/en-us/Documents/immunization_hpvimplementationguidance.pdf

American Academy of Pediatrics. (2019). AAP Urges Major Technology Companies to Combat Vaccine Misinformation Online. Retrieved from https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/Vaccine-Misinformation-Tech-Company-Letters.aspx

Brewer NT, Hall ME, Malo TL, et al. Announcements Versus Conversations to Improve HPV Vaccination Coverage: A Randomized Trial. *Pediatrics.* 2017;139(1):e20161764

Cook DA, Price DW, Wittich CM, West CP, & Blachman MJ. (2017). Factors Influencing Physicians' Selection of Continuous Professional Development Activities: A Cross-Specialty National Survey. Journal of Continuing Education of Health Professionals, 37(3), 154-160. Doi: 10.1097/CEH.0000000000000163

Cook DA, Blachman MJ, Price DW, West CP, Baasch Thomas BL, Berger RA, & Wittich CM. (2018). Educational Technologies for Physician Continuous Professional Development: A National Survey. Academic Medicine; 93: 104-112. Doi: 10.1097/ACM.0000000000001817

Centers for Disease Control and Prevention. (2011). CDC Identifies 10 Public Health Achievements of First Decade of 21st Century. Retrieved from https://www.cdc.gov/media/releases/2011/p0519_publichealthachievements.html

Centers for Disease Control and Prevention. (2015). Epidemiology and Prevention of Vaccine-Preventable Diseases. Retrieved from https://www.cdc.gov/vaccines/pubs/pinkbook/hib.html

Centers for Disease Control and Prevention. (2016). HPV Vaccine Recommendations. Retrieved from https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html

Cervivor https://cervivor.org

Dempsey, A, Pyraznowski, J., Lockhart, S., Campagna, E., Barnard, J., & O'Leary, S. (2016). Parents' perceptions of provider communication regarding adolescent vaccines. Human Vaccines & Immunotherapeutics, 12(6): 1469-1475. DOI 10.1080/21645515.2016.1147636

Gilkey, M., Malo, T., Shah, P., Hall, M., Brewer, N. (2015). Quality of Physician Communication about Human Papillomavirus Vaccine: Findings from a National Survey. Cancer Epidemiological Biomarkers & Prevention. 24:1673-1679. Published OnlineFirst October 22, 2015. https://doi.org/10.1158/1055-9965.EPI-15-0326

Gilkey, M., Calo, W., Moss, J., Shah, P., Marciniak, M., Brewer, N. (2016). Provider communication and HPV vaccination: The impact of recommendation quality. Vaccine, 34: 1187-1192. http://dx.doi.org/10.1016/j.vaccine.2016.01.023

Google Drive. https://www.google.com/drive/

Head, K., Biederman, E., Sturm, L., & Zimet, G. (2018) A retrospective and prospective look at strategies to increase adolescent HPV vaccine uptake in the United States, Human Vaccines & Immunotherapeutics, 14:7, 1626-1635. https://doi.org/10.1080/21645515.2018.1430539

Healthy People 2020. (last update 2019). Immunization and Infectious Disease. Retrieved from www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives

HPVIQ: Immunization Quality Improvement Tools. (2019). Retrieved from www.hpviq.org

HPV Vaccination for Cancer Prevention: Progress, Opportunities, and a Renewed Call to Action. A Report to the President of the United States from the Chair of the President's Cancer Panel. Bethesda (MD): President's Cancer Panel; 2018 Nov. Retrieved from https://prescancerpanel.cancer.gov/report/hpvupdate

Institute of Medicine (IOM). (1994). Overcoming Barriers to Immunization: A Workshop Summary. J.S. Durch, ed. Washington, D.C.: National Academy Press.

Kaiser Family Foundation (KFF). (2018). The HPV Vaccine: Access and Use in the U.S. Retrieved from www.kff.org/womens-health-policy/fact-sheet/the-hpv-vaccine-access-and-use-in-the-u-s/

National Cancer Institute (NCI). (2019). HPV and Cancer. Retrieved from https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-and-cancer

Oakley, F., Desouki, M., Pemmaraju, M., Gargano, J., Markowitz, L., Steinau, M.…Griffin, M. (2017). Trends in High-Grade Cervical Cancer Precursors in the Human Papillomavirus Vaccine Era. Am J Prev Med 2018;55(1):19–25. DOI 10.1016/j.amepre.2018.03.015

Palmer, J., Carrico, C. & Costanzo, C. (2015). Identifying and Overcoming Perceived Barriers of Providers towards HPV Vaccination: A Literature Review, Journal of Vaccines, vol. 2015, Article ID 869468, 7 pages, 2015. Retrieved from https://doi.org/10.1155/2015/869468

Proctor, E., Landsverk, J., Aarons, G., Chambers, D., Glisson, C., and Mittman, B. (2009). Implementation Research in Mental Health Services: an Emerging Science with Conceptual, Methodological, and Training challenges. Administration and Policy in Mental Health, 36:24–34. DOI 10.1007/s10488-008-0197-4

Proctor, E., Silmer, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., …Hensley, M. (2011). Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda. Administration and Policy in Mental Health, 38:65-76. DOI 10.1007/s10488-010-0319-7

Quinn, RE. (2005). Moments of Greatness. *Harvard Business Review*, *July-August 2005, pp. 1-11.* Retrieved from lecture notes, PUBH 790 Leadership Course, David Steffen, UNC Gillings School of Global Public Health. Retrieved from https://hbr.org/2005/07/moments-of-greatness-entering-the-fundamental-state-of-leadership

Reiter PL, Gerend MA, Gilkey, MB, Perkins, RB, Saslow, D, Stokley, S, …Brewer, NT. (2018). Advancing Human Papillomavirus Vaccine Delivery: 12 Priority Research Gaps. Academic Pediatrics 18:S14–S16

Sankaranarayanan, R. (2015). HPV vaccination: The most pragmatic cervical cancer primary prevention strategy. International Journal of Gynecology and Obstetrics 131 (2015) S33–S35. DOI 10.1016/J.IJGO.2015.02.014

Shah PD, Calo WA, Gilkey MB, Boynton MH, Alton Dailey S, Todd KG, Robichaud, MO, Margolis MA, Brewer, NT. (2019). Questions and concerns about HPV vaccine: A communication experiment. *Pediatrics* published online: date (doi: 10.1542/peds.2008-1536)

Shewhart WA: The economic control of quality of manufactured product (1931). Milwaukee (WI): ASQC, 1980.

World Health Organization. 10 Threats to Global Health in 2019. Retrieved from www.who.int/emergencies/ten-threats-to-global-health-in-2019

Zoom Video Communications. https://zoom.us/about